IN-SITU AB[illegible]VE BELT/PLAINER CLE[illegible]G SYSTEM

Field of Invention

This invention relates to a system for in-situ cleaning of abrasive sanding or planing media used for sanding, planing, grinding or for otherwise abrasively preparing or finishing wood, metal or other surfaces and, in particular, to the utilization of dry ice (CO_2 ,solid carbon dioxide) particles for cleaning the abrasive media surfaces [in-situ] while the abrasive media is being used for its' intended purpose, or [removed] while the abrasive media is not being used.

Background of the Invention

Abrasive sanding or planing devices, (also referred to as sandpaper, sanding belts, abrasive planers, or grinding surfaces), are used throughout industry for removing a portion of a material's surface as to create a suitable surface finish for the specific requirements. In the woodworking industry, sanding belts are used for removing a portion of the wood surface from a piece of wood as to create a particular finish on the resulting wood surface. An example of such a sanding (abrasive) belt is the VFM 36"x75", 80 grit belt. A typical abrasive belt such as the VFM 36"x75" would be approximately 36" x 75" and the belt would be typically placed into an automatic wide belt sanding device, with the abrasive surface exposed, and held in place by a series or rollers in the sanding equipment, equipment such as the Cemco Model 2000 wide belt sander. The Cemco Model 2000 would then be turned on and the abrasive belt would then begin to rotate. An operator would then begin placing material into a pathway as to come into contract with the abrasive surface of the VFM 36"x75" belt. As the abrasive surface of the belt comes into contact with the material being sanded, the abrasive surface of the belt removes a portion of the wood surface and, as a result of this sanding operation, the widebelt begins to "load" up with pieces of the material being sanded. In wood products this "loading" may comprise pieces of wood, sap, glue and/or burnt wood particles. The abrasive surface of the belt will continue to sand a surface until it becomes loaded to the extent where it ceases to provide the necessary sanding characteristics. At this time, the operator typically removes the sanding belt and replaces it with a new one, permanently disposing of the used, loaded up, abrasive sanding belt.

In the prior art, attempts to clean abrasive sanding/planing media have included the use of solvents, water or a gummy type solutions requiring that the abrasive belt be removed and applying the solution to the surface. As a result of this cleaning method, the belt is only partially cleaned. In addition, the belt, most often having a paper type backing, tends to stretch after exposure to these cleaning solutions and will no longer fit correctly onto the sanding equipment. In any case, the belt life is greatly reduced from these methods of cleaning. A problem with removing the belts from the equipment is that it reduces the production capacity of the machine

at a rate relative to the [illegible]nt of time required to shut the machine [illegible]n and remove, replace and reset the belt on the machine, and it requires the retensioning the belt on the equipment to their previous tensions so that the material being process through the equipment will have the same finish as the previous material process before cleaning the abrasive belts. Since the belts tend to stretch after application of the cleaning solution(s), the belts either do not tighten correctly or they fall apart as the equipment is turned on and operated. Another major problem is that as the abrasive belt loads up, the amount of sanding/grinding/planing decreases and effects the quality of the materials being processed.

The problem of not being able to clean the abrasive surface of sanding, planing, or grinding equipment is a major problem in the area of surface preparation/finishing. The cleaning of abrasive sanding, planing, and/or grinding surfaces is a long outstanding problem within the woodworking and metalworking industry which the prior art(s) have not been able to solve.

SUMMARY OF THE INVENTION

The problems discussed above are eliminated by a method, process and apparatus that involves the in-situ cleaning of the abrasive sanding, planing or grinding surface by propelling dry ice (CO_2 ,solid carbon dioxide) particles at the abrasive sanding, planing or grinding surface at varying angles as to clean the entire abrasive surface. After numerous hours of experiments and testing, the results achieved have been unexpected as the abrasive belts have been completely cleaned, in-situ, like new, without causing any damage to the abrasive sanding, planing or grinding surface or to the belt's backing as a result of the impact of the dry ice particles. Furthermore, the belts may be cleaned in the application equipment while the equipment is operational and processing material, without effecting the equipment's operation, and drastically increasing the quality of the finished material. Initial test results indicate that a typical abrasive sanding, planing or grinding belt may be cleaned and reused a minimum of at least two (2) times during its' usable life, meaning that a user may reduce his new abrasive belt purchases by a factor of a least two (2). In additon, significant production savings are realized by not having to change the abrasive belt as often when it is cleaned in-situ with the dry ice particles.

Detailed Description Of The Drawing

Figure 1, A through **L** illustrate view of the cleaning system with the exception that the CO_2 particle blaster **M**, and hoses **N** and **O**, and dry ice storage means **P**, and dry ice grinding means **Q**, and suction or vacuum device or apparatus **R** of **FIGURE 1** are not shown.

As illustrated in **FIGURE 1**, element **L** represents a typical abrasive belt sanding apparatus that is connected to a belt sanding piece of equipment **I** by means of tension rollers **(H)**; whereas, the CO_2 particle blaster **M**, and hoses **N** and **O**, and dry ice storage means **P**, and dry ices grinding means **Q** are located remotely from the belt sanding equipment or surface. The dry ice directional dispensing device **G** for the blast installation, the use of a nozzle is sufficient, such as is known from dry ice surface preparation technology, is connected to the CO_2 particle blaster **M**, by means of hoses **N** and **O**, and the system is supplied with dry ice particles for blast cleaning by storage means **P**, or by dry ice grinding or shaving means **Q**. An opening is made ine the abrasive belt sanding apparatus **F** and an x-rail motion control device **A,B & C** is connected to the belt sanding apparatus. The x-rail motion control device **A,B, & C** has a mounting device **B** for connecting the dry ice dispensing device **G**. The particles of dry ice being propelled by means of the dry ice directional dispensing nozzle **G** are directed towards the abrasive belt **I** surface as the abrasive belt **I** is being rotated by means of tension rollers **H** or as the abrasive belt **I** is stationary or removed. The removed surface contaminants may be captured, contained and/or collected by means of suction or a vacuum device or apparatus **R**. The dry ice directional dispensing nozzle **G** may be directed towards the abrasive belt **I** surface by manual means or by means of attaching the dry ice directional dispensing nozzle **G** to an x-rail motion control device **A,B & C** that will automatically move the dry ice directional dispensing nozzle **G**, at a fixed or variable distance from the abrasive belt **I** surface, across the x-axis of the abrasive belt **I** surface. The angle of impact of the dry ice particles, and the cleaning ability of this system is optimized at the angle shown between the directional dispensing device **G** and the tension roller **H**.

Although several embodiments of this invention have been illustrated and described, it is to be understood that by one skilled in the art that numerous changes and modifications may be carried out in this invention shown and described without departing from the spirit and scope of the claimed invention. In particular, one skilled in the art could readily envision removing the abrasive belt from the equipment and clean the belt removed from the equipment. Further, one skilled in the art could readily adapt the process for cleaning other types of sanding, planing and grinding surfaces than those specified within the embodiment.